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Tojibaev, Komiljon

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Original Article

An updated checklist of *Primula* species (Primulaceae) in Uzbekistan

Komiljon Tojibaev^{a,b}, Farkhod Karimov^a, Furkat Khassanov^a, Alexander Sennikov^{c,d},
Mansur Usmonov^{a,e,*}

^a National Herbarium, Institute of Botany of Academy of Sciences of the Republic of Uzbekistan, Durmon yuli str., 32, 100125, Tashkent, Uzbekistan

^b National University of Uzbekistan, Almazar distr., Universitet shakharchasi 4, 100174, Tashkent, Uzbekistan

^c Komarov Botanical Institute of Russian Academy of Sciences, Prof. Popov Str. 2, RU–197376 St Petersburg, Russia

^d Botanical Museum, Finnish Museum of Natural History, P. O. Box 7, University of Helsinki, FI–00014, Finland

^e Department of Biology Education, Kongju National University, Gongju-si, 32582, South Korea

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ABSTRACT

A taxonomic revision of the genus *Primula* in Uzbekistan is presented including a key, complete synonymy and distribution for all taxa with distribution maps. The present study has established the rich diversity of *Primula* species in Uzbekistan with a record total of 13 species. The species is recognized and grouped into seven sections. Most of the species (38%) belong to the section *Cortusa*. Two species, *Primula pamirica* and *Primula pskemensis* were recorded as a new species for the flora of Uzbekistan.

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Introduction

Primula L., comprising more than 500 species, is the largest genus of Primulaceae (Fedorov 1952; Kovtonyuk and Goncharov 2009; Kovtonyuk 2011; Yan et al 2015; Xu et al 2016). The genus is mainly distributed in the North Temperate Zone, with only a few outliers in the mountainous regions of Africa, tropical Asia, and South America. Its modern species richness center is in West China, with approximately 300 species, most of which occur in Western Sichuan, Eastern Tibet, and Northwestern Yunnan, which are largely located in the Himalayan-Hengduan Mountains region (Xu et al 2016). Over the past ten years, it has been reported several of new species (Xu et al 2019) described from the primary center of species diversity (western Sichuan, eastern Xizang, and northwestern Yunnan), which confirm to the special attention of scientists to species of the *Primula*. Middle Asia is harboring a smaller number of *Primula* species. Kovalevskaya (1986) reported 25 species of *Primula* from the different parts of this region, and only two new species from this region have

been described for last 25 years (Turakulov and Gazybaev 1995; Lazkov 2004).

The genus *Primula* L. can explicitly be recognized by its perennial habitat, basal rosette of leaves, heterostylous flowers with obvious tube and capsular fruits (Xu et al 2016). The majority of *Primula* species are perennial short-root herbs, sometimes monocarps. Many species are ornamental plants and have been used to breed numerous cultivars of garden primroses (Kovtonyuk 2006).

The complete *Primula* diversity of the Middle Asian Mountains region (including Uzbekistan) is still unknown, as no extensive study on *Primula* species has so far been conducted in this area, which is biogeographically linked with Tajikistan, Kyrgyzstan, and Kazakhstan. In 5th volume of the old “Flora of Uzbekistan” (Kovalevskaya 1961) provided the first detailed treatment of ten *Primula* species of Uzbekistan. This treatment, although of the highest quality possible in those times, is largely outdated. Therefore, an extensive field survey of *Primula* in the mountains of Uzbekistan and herbarium revisions was carried out to know the diversity, distribution of the species so that conservation and management practices could be initiated.

In accordance with the concept of the Flora of Uzbekistan project (Sennikov et al 2017), it carried out a critical treatment of herbarium specimens collected from the territory of the Flora. In accordance with analysis of literature data (Hu and Kelso 1996;

* Corresponding author. Tel.: +10 8603 6909.

E-mail address: mansur.usmonov@inbox.ru (M. Usmonov).

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Richards 2002; Lazkov 2004; Byalt 2006; Kovtonyuk and Goncharov 2009; Kovtonyuk 2013; Yan et al 2015) and the results of taxonomic treatments, we found 13 species of *Primula* for the Flora of Uzbekistan. Among them, two species were discovered first time from the territory of Uzbekistan (indicated by the symbol an asterisks – *).

The particular aims of our study are as follows: (1) obtaining a better understanding of systematical composition within the sections; (2) clearly show their occupied areas by the botanic-geographical regions in Uzbekistan, and so on. In addition, an identification key of useful distinguishing characters of species are given.

Material and methods

Study area

The study has been carried out in Central and Eastern Uzbekistan biogeographical regions: (1) South Western Hissar lies between 67°0'N–37°0'E, 67°0'N–36°0'E and 66°0'N–37°0'E, SW boundary adjoins to the mountains of the NE Turkmenistan. The region includes Kuhitang district which is bordered with of Tajikistan in the southwest, Kashkadarya, and Baysun; (2) Hissar-Darvaz (Sangardak-Tupalang dist.), lies between 66°0'N–38°0'E, 67°0'N–38°0'E. The region is bordered by mountains of Tajikistan in the east and north. The vegetation types range from lower to alpine between altitudinal ranges of 500 m to 4500 m; (3) Kuhistan region (Malguzar and North Turkestan dist.) lies between 67°0'N–40°0'E and 68°0'N–40°0'E. Its southern and eastern part located in boundary Tajikistan, a river basin Zeravshan separate it from north Zeravshan range. The vegetation types range between altitudinal ranges of 700 m to 5500 m; (4) Western Chatkal is one of the Western mountains part of Tien Shan and include the researched areas Ugam-Pskem, Arashan, and Kurama districts, lies between 70°0'N–41°0'E and 69°0'N–41°0'E; (5) Kyzylkum (Kyzylkum Relic Mountains) lies on 65°0'N–41°0'E; (6) Fergana-Alay, the only enclave zone of Uzbekistan and the region is located at 71°0'N–39°0'E. All regions are mostly mountainous.

Data analysis

Our taxonomic revision is based on the use of living and herbarium material from various systematic collections. Herbarium specimens, including type materials, were examined. Extensive field surveys were conducted during the growing season from March 2012 to September 2017 at elevations between 1500 m and 4500 m in the selected area for the analysis of diversity and distribution of the *Primula* species. Specimens of various associate plant species were collected and herbarium of each species was prepared and preserved for identification. The herbarium specimens thus prepared have been deposited in the herbarium of National Herbarium Institute of Botany (TASH) of Academy of Sciences of the Republic of Uzbekistan. The species were identified with the help of various floras (Fedorov 1952; Kovalevskaya 1961, 1986; Hu and Kelso 1996; Kovtonyuk 2006, Lazkov and Sultanova 2011; Sennikov 2017) and herbarium specimens at the major herbaria namely TASH, the Moscow State University MW, Komarov Botanical Institute LE, Institute of Biology of National Academy of Sciences of Kyrgyzstan FRU and Institute of Botany and Phytointroduction Ministry of Science, Academy of Sciences of Kazakhstan AA. The coordinates of plant records were imported into ArcGIS 10.0 and transformed to a point map layer. A WGS84 Geographic coordinate system was used as a reference datum. Digitizing of the herbarium specimens was carried out by scanning with HerbScan TM 224 + Epson Expression 10000 XL.

The symbols used in this study are as follows: *Homotypic synonym* (nomenclatural synonym) indicated by the symbol “≡”; *Heterotypic synonym* (taxonomic synonym) indicated by the symbol “=”.

Systematic accounts

Genus *Primula* Linnaeus, Sp. Pl. ed.1: 205 (1753)

Type species: *Primula vera* Linnaeus

= *Cortusa* Linnaeus, Sp. Pl. 1: 144 (1753).

Type species: *Cortusa matthioli* Linnaeus

= *Dionysia* Fenzl, in Flora 26: 389 (1843).

Type species: *Dionysia odora* Fenzl

Calyx tubular, campanulate or funnel form, persistent, rather deeply lobed; corolla tube distinct and usually fairly long, somewhat enlarged at the mouth; corolla limb flat or funnel form, very rarely subcampanulate, the lobes entire or bifid; stamens inserted in the throat, the filaments very short, the anthers obtuse; ovary superior, globose or ovoid; style filiform, with a capitate stigma. Many species display heterostylism, the style in long styled flowers usually equaling the tube and in short-styled flowers half as long as the tube; ovules numerous, usually amphitropous; on a free central placenta; capsule globose or cylindrical, many seeded, 5–10-lobed; seeds dorsally flattened, convex ventrally, commonly angular; embryo transverse. Perennial herbs, rarely monocarpic plants. Leaves exclusively rosulate, entire or spatulate, petiole or sessile; flowers in umbellate or subglobose inflorescences in whorls (proliferated umbels), rarely solitary (on subradical peduncles when scape undeveloped); bracts usually narrow, lanceolate, sometimes gibbous or saccate.

1. *Primula* sect. *Cortusa* (Linneanus) V.A.Richt., in Természetrájzi Fü. 17: 134 (1894).

Section type: *Cortusa matthioli* Linneanus

—*Cortusa* Linneanus, Sp. Pl. 1: 144 (1753)

= *Primula* sect. *Cortusoides* Balf.f., in J. Roy. Hort. Soc. 39: 140 (1913)

Type species: *Cortusa matthioli* Linneanus

= *Primula* sect. *Cortusoides* Balf.f. in J. Roy. Hort. Soc. 39: 140 (1913)

Type species: *Primula cortusoides* Linneanus

1. **Primula pskemensis* Lazkov, Novosti Sist. Vyssh. Rast. 36: 36 (2004).

(Figure 1E)

Type. KYRGYZSTAN: PSKEM RANGE. In headwaters Alma-Sai, right tributary. Chandalash, 17.06.2003, G. Lazkov, N. Kenjebaeva (holotype, LE!, isotype, FRU!)

—*Primula minkwitziae* auct. non W.W. Sm.: Kovalevskaya in Fl. Uzbekistan 5: 35 (1961); Kovalevskaya in Conspectus Fl. Asiae Med. 8: 12 (1986).

Type. KYRGYZSTAN: in Talas Alatau, pass Ulkun-Kaindy (LE!)

Diagnosis. Perennial, rhizome short, with tufts of roots. Scape 7–15 cm long, densely pubescent with long glandular hairs. Leaves with petioles 4–12 cm long and reniform short-lobed plate 2.5–8 cm long, 2–5 cm wide, along the edge serrated or toothed, densely pubescent with long glandular hairs. Involucral bracts 4–6, lanceolate, 0.5–1 cm long, pubescent with glandular hairs. Calyx 7–11 mm long, cylindrical, up to 1/2 incised into acute lanceolate lobes, green, with short glandular hairs. Corolla greenish-yellow, pubescent on the outside with long and short glandular hairs; corolla tube cylindrical, about 1–1.5 cm long; limb flat, 1–1.5 cm in diam. Fl. June.

Taxonomic notes. This species is very close to *Primula Eugenie* but differs by the glandular, pubescent calyx, and smaller flowers.

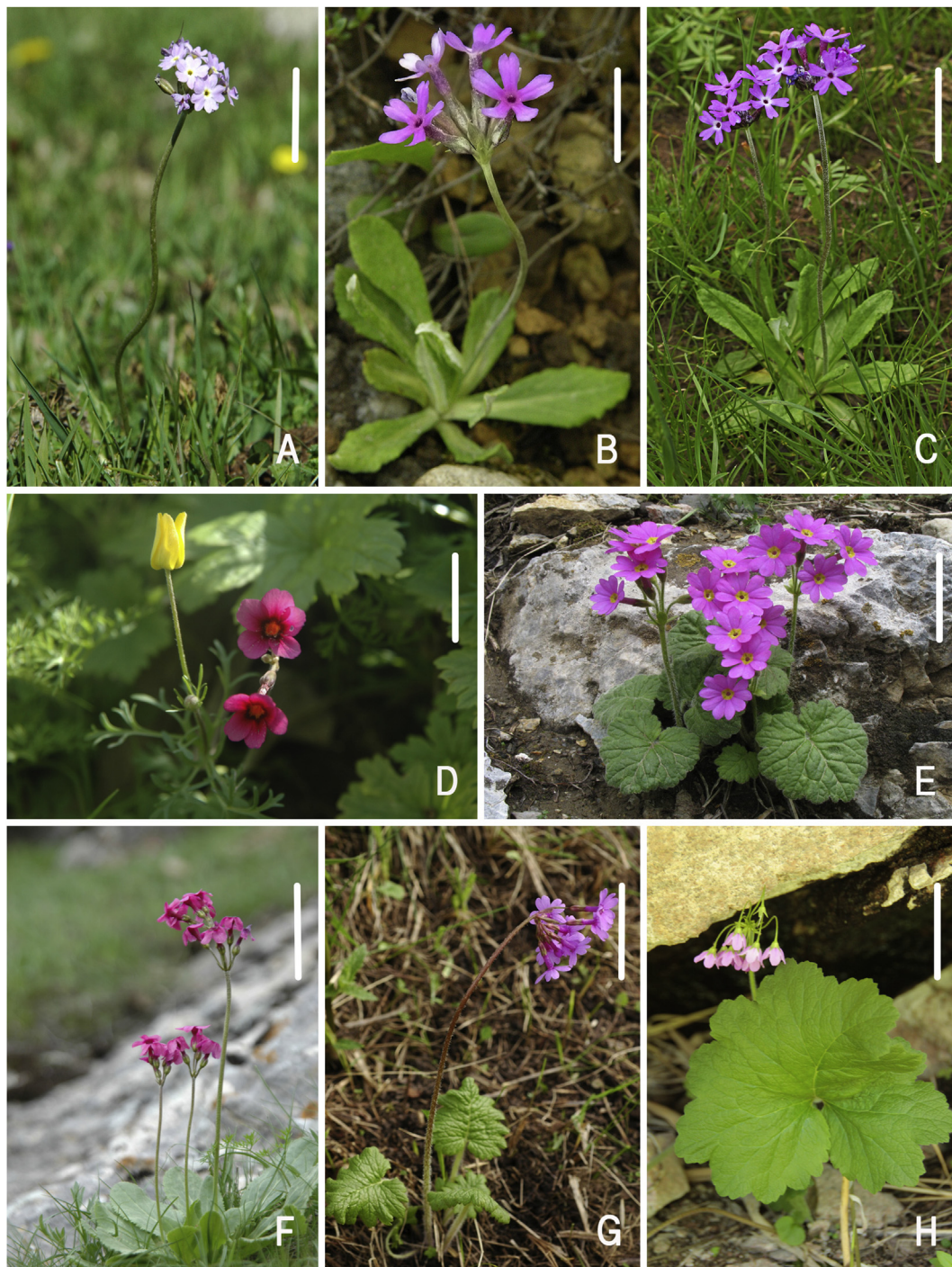


Figure 1. Morphological comparisons between species at blooming stage: A, *Primula algida* (photo by Tojibaev); B, *Primula baldshuanica* (Shevyreva); C, *Primula capitellata* (Gaziyev); D, *Primula geranophylla* (Tojibaev); E, *Primula pskemensis* (Kolbinsev); F, *Primula fedtschenkoi* (Tojibaev); G, *Primula kaufmanniana* (Epiktetov); H, *Primula matthioli* (L.) V.A.Richt. subsp. *turkestanica* (Usmonov); I, *Primula olgae* (Banketov); J, *Primula pamarica* (A. Naumenko); K, *Primula turkeviczii* (Epiktetov); L, *Primula hissarica* (Turginov); M, *Primula iljinskii* (Suyunkulov). <scale bar: 2 cm (A-M)>.

Habitat. In the cracks of the rocks, with snowfields in the upper mountain belt, 2,500–3,200 m.

General distribution. Middle Asia: (Tien Shan: Pskem): Kyrgyzstan, Uzbekistan.

Distribution in Uzbekistan. I-1 Western Tien-Shan region. I-1-a Ugam-Pskem district: PSKEM RANGE (right bank of Jiydasay, 03.07.1967, Blajeevich [TASH!]; in the crevices of the rocks at the very top of Aksar-sai near the settlement Nanay, 06.23.1948, Pavlov [MW!]).

2. *Primula turkeviczii* V.V. Byalt, in Novon 16(1): 23-24 (2006). nom. illeg., non (Fisch.) Kuntze (1891); Fedorov in Fl. USSR 18: 125 (1952); Kovalevskaya in Fl. Uzbekistan 5: 35 (1961); Kovalevskaya in Conspectus Fl. Asiae Med. 8: 11 (1986). (Figure 1K)

Type. TAJIKISTAN: TURKESTAN RANGE. In Mogian, 4,500, the deciduous trees zone, May 1893, Mosquitoes (holotype and isotype, LE!) —*Primula lactiflora* Turkev. in Not. Syst. Herb. Horti Bot. Petrop. 2: 13 (1921).



Figure 1. (continued).

≡ *Auganthus lactiflorus* Sojak, Čas. Nár. Muz. Praze, Rada Přír. 148(3–4): 208 (1980).

Diagnosis. Perennial, rhizome short, oblique, plant pubescent. Leaves orbicular-ovate, with a cordiform base; lobes large and unevenly serrated, adaxial dark green, almost glabrous or pubescent with separate hairs, abaxial pale, slightly hairy along veins; petioles thin and long, narrow-winged, equal in length to the plate or twice exceeding, curly hairy. Scape thin, longer than leaves, lower part rather densely hairy. Inflorescence umbellate or consisting of two close whorls. Pedicels number 2–10, 8–20 mm long., thin, glabrous. Involucral bracts scapular-lanceolate, acutate, much shorter than peduncle. Calyx tubular, up to 1/3 incised into lanceolate teeth, with prominent veins. Corolla with milky white limb, 6–16 mm diam.; tube narrow, dark violet, in the throat somewhat enlarged, 2–2.5 times exceeding calyx; corolla lobe obcordate, with hollow and rounded lobes. Capsule (fruitcase) oval-cylindrical, exceeding calyx. Fl. May–June.

Taxonomic notes. This species was known as *P. lactiflora* Turkevich but it has been determined that the name was previously used (*nom illeg.*). It is very similar to *P. kaufmanniana* but is distinguished by its white flowers with a narrow purple tube. *P. turkevicii* differs from other species of *Primula* in this region by the corolla with milky white lobes and dark violet tube and by its calyx with prominent nerves (Byalt 2006).

Habitat. Under the rocks, at the snowfields in the upper mountain belt, 2,300–3,200 m.

General distribution. Middle Asia: W Pamir-Alay (Alay, Turkestan ranges). Tajikistan, Kyrgyzstan, Uzbekistan.

Distribution in Uzbekistan. I–5 Kuhistan district. I–5–a North Turkestan region: TURKESTAN RANGE (River basin Guralash, headwaters

Guralashsaya, 05.07.1935, Zakrzhevsky 677; headwaters of Sanzar, reserve Guralash, 13.06.1937, Korotkova, Vassilkovskaya 321; headwaters of Sanzar, reserve Guralash, 1938, Korotkova; River basin Tyuyatashsai, 14.06.1947 Nazarenko) - All in TASH.

3. *Primula geranophylla* Kovalevsk., in Not. Syst. Herb. Inst. Bot. Acad. Sci. Uzbekistan. xv. 14 (1959); Kovalevskaya in Fl. Uzbekistan 5: 36 (1961); Kovalevskaya in Consp. Fl. Asiae Med. 8: 12 (1986). (Figure 1D)

Type. UZBEKISTAN: HISSAR RANGE. In Chulbair Mountains, village Sina, northern pit-run fines slopes at the bottom of the rose gardens, 17.04.1958, Vvedensky, Kovalevskaya, Tscherneva 271 (holotype, TASH!)

Diagnosis. Perennial, rhizome short, releasing numerous thin roots. Leaves roughly orbicular, divided into lobes, incised into narrow acutate segments, 3–7 cm long and 2–5 cm wide, adaxial light green, glabrous, abaxial paler, pubescent; petioles narrow-winged, pubescent with sparse anfractuous hairs, 2–3 times exceeding plate. Scape long, exceeding leaves, pubescent with glandular and anfractuous hairs. Inflorescence umbellate, flowers 4–5. Involucral bracts linear-lanceolate, acute, and glandular-pubescent. Pedicels 1–2 cm long, glandular pubescent. Calyx tubular, later tubular-campaniform, 1/3 incised into triangular lobes, glandular pubescent. Corolla light purple, approx. 1.5 cm diam; corolla lobes shallowly sinuate. Capsule oblong-rounded, 7–7.5 mm long. Fl. July–August.

Taxonomic notes. *P. geranophylla* differs from *P. Minkwitzae* W.W. Sm. (*P. drosocalyx* P. Pol. et Lincz.) by leaves divided into rhomboblong parts, incised into narrow acutate lobes and a small Capsule that slightly exceeds the calyx (Kovalevskaya 1959).

Habitat. On loess slopes, among bushes, in rock crevices in the upper part of the lower belt and in the middle belt of mountains, 1.400–2.500 m a.s.l.

General distribution. Middle Asia (South Pamir-Alay): Tajikistan, Uzbekistan.

Distribution in Uzbekistan. I-6 West Hissar region. I-6-c Baysun district: HISSAR RANGE (Baysuntau, 14.04.2011, *Turginov* 98; spurs of Southwest Hissar, vill. Gumatak, 04.14.2011, *Turginov* 0990; Baysuntau, Khodzhaqurur-ata mountains, 23.04.2011, *Khudoyshekurov* 990, 991; neighborhood Khut, Gumatak, 23.04.2012, *Turginov* 0990a). I-7 Hissar-Darvaz region. I-7-a Sangardak-Tupalang district: HISSAR RANGE (neighborhood of the village Nilu, 25.03.2010, *Tojibaev, Maltzev*).

4. *Primula kaufmanniana* Regel, in Acta Horti Petropolit. 3(2): 131 (1875).

Fedorov in Fl. USSR 18: 126 (1952); Kovalevskaya in Fl. Uzbekistan 5: 36 (1961); Kovalevskaya in Consp. Fl. Asiae Med. 8: 12 (1986).

(Figure 1G).

Type. Described from Kazakhstan (neighborhood Alma-Ata, Dzungarskiy Alatau: mountains Kopal) and Kyrgyzstan (lake Jasyel-Kel, Terskey Alatau: pass Zauku). Type is not indicated.

Diagnosis. Perennial, rhizome short, roots numerous, thin. Scape 10–30 cm. Leaves in rosette, 4–8 x 3–8 cm, rounded-cordate, lobed, segments toothed, adaxial dark green, smooth or with few individual hairs, abaxial and mainly along the veins rather densely hairy; petiole longer (10–15 cm) than blade. Inflorescence umbellate (5–7 cm across), consisting of 2 approximate whorls. Involucral bracts linear-lanceolate, acute, entire or toothed at apex. Calyx tubular or tubular-campanulate. Corolla pink-violet. Evergreen, new leaves early spring, late summer. Capsule oblong, exceeding the calyx. Fl. May–July in the wild and Fr. September.

Taxonomic notes. Closely related to *P. turkeviczii* (formerly *P. lactiflora*) also from the same area but which is white flowered with a violet tube. White forms of *P. kaufmanniana* exist but in *P. turkeviczii* the leaves are thinner, membranous and the petioles, scape and pedicels are very slender and the tube is narrower. *P. kaufmanniana* resembles the more familiar *P. cortusoides* but with orbicular leaves, cordate at the base, divided into blunt lobes. *P. kaufmanniana* is hairy, especially the scape and the veins on the below of the leaves.

Habitat. On the rocks at the subalpine and upper belt of the mountains, 2.500–3.400 m a.s.l.

General distribution. Middle Asia (Western Tien Shan: Talass Alatau, Kyrgyz Alatau, Pskem, Ugam; Pamir-Alay: Turkestan, Zaravshan): Kazakhstan, Tajikistan, Kyrgyzstan, Uzbekistan.

Distribution in Uzbekistan. I-1 Western Tien-Shan region. I-1-a Ugam-Pskem district: PSKEM RANGE (Bostandyk, slope at the top Aksarsay, 27.07.1949, *Pavlov* 233 [MW!]; at the top of Ju-say, 24.07.1949, *Pavlov* 139 [MW!]). UGAM RANGE (Gorge Kay-nazarsay, 2.400 m a.s.l. 26.08.1954, *Pavlov* 305 [MW!]). I-3 Fergana-Alay region. I-3-a Western Alay district: ALAY RANGE (neighborhood Shakhimardan, 09.06.1933, *Drobov, Sakhobutdinov* 35; Shakhimardan, 05.06.1936, *Tomilova, Khrjanovskiy*; meadow steppe with *Juniperus* along the Koshkarchi River, 30.06.1936, *Tyshchenko, Rozhkovskaya* 139; Shakhimardan, 07.06.1947, *Shafeev*; Shahimardan river basin, Yordan, 06.29.1961, *Pyataeva*; Shakhimardan, 06.06.1964, *Shonazarov*; neighborhood of the village Yordan, 15.06.1964, *Shonazarov* 143; Yordan, Khurdzhuntau, 22.05.1965, *Khalkuziev*; Shakhimardan river basin, Bukan Mountains, 10.06.1966, *Khalkuziev*; Aksu river basin, neighborhood Yordan, Khurdzhuntau, 09.05.1979, *Kamelin, Makhmedov* 1). I-7 Hissar-Darvaz region. I-7-a Sangardak-Tupalang

district: HISSAR RANGE (Tupalang river basin, Darasay, 17.06.1948, *Pyataeva* 1073).

5. *Primula matthioli* (Linneanus) V.A.Richt., in Természetrzaji Füz. 17: 134 (1894).

Type. AUSTRALIA: in monte Draunstein prope Gmundam, Bursen's Hortus Siccus XIII: 155 (lectotype, UPS)

—*Cortusa matthioli* Linneanus, Sp. Pl. 1: 144 (1753).

5a) *Primula matthioli* subsp. *turkestanica* (Losinsk.) Kovt., Novosti Sist. Vyssh. Rast. 44: 163. 2013.

(Figure 1H)

Type. UZBEKISTAN: CHATKAL RANGE. In nemore betulaceo as declivia montis Tschimgan majoris, alt. 2.200 m, 15.07.1926, *Gomolitzky & Ljuschin* (holotype, LE!)

≡ *Cortusa turkestanica* Losinsk., in Tr. Bot inst. USSR Academy of Sciences (ser. 1) 3: 239 (1936).

—*Cortusa matthioli* subsp. *turkestanica* (Losinsk.) Iranshahr & Wendelbo, in Iranian J. Bot. 1: 58 (1976).

Diagnosis. Plant 25–60 cm tall. Leaves 10–14 (16) cm wide, adaxial dark green, glabrous or with sparse hairs, abaxial light-colored, pubescent, ciliate along the edge, broadly ovoid in outline, irregularly cordate, lobed at the base; coarse-toothed lobes, oval teeth, end with a spine or without it; petiole long, up to 30 (40) cm, pubescent, broad-winged. Scape downy. Umbel (7) 10–25 flowered. Involucral bracts wide, foliaceous, unevenly incised serrated at the top. Calyx 6–8 mm long, pubescent or almost glabrous; teeth triangular-lanceolate, acuminate. Corolla 1–1.3 cm long, white or purple, with oblong, rounded at the top ridge limbs, gradually narrowed into a short, up to 2 mm, tube. Capsule longer than corolla. Fl. May–July.

Taxonomic notes. Formerly described as a single species under the Genus *Cortusa*, recent studies have shown this species belongs under *Primula*. (Kovtonyuk) Unlike other *Primulas* that have filaments attached to the side of the tube, the filaments are connected into a thick ring at the base of the corolla. Across its range, *P. matthioli* shows continuous variation in the leaf shape and the amount of pubescence. In the past, some authorities designated the various forms as separate species (or forms and varieties), but current taxonomy has relegated them to be ssp. of *P. matthioli*.

Habitat. Along the banks of streams and rivers, in the shadow of the rocks in the juniper, 1.700–2.300 m a.s.l.

General distribution. Afghanistan, Middle Asia (Tien Shan, Pamir-Alay): Tajikistan, Uzbekistan.

Distribution in Uzbekistan. I-1 Western Tien-Shan region. I-1-a Ugam-Pskem district: KORJANTAU RANGE (Mingbulak, 07.06.1962, *Nabiyev, Pakhomova* 101; Mingbulak, 19.06.1962, *Nabiev et al.*). KOKSU RANGE (upper course of the Kok-su river, at the confluence of the Ayryk river, 23.05.1970, *Adylov*); PSKEM RANGE (Choralma river valley, 1.800 m a.s.l., 01.08.1954, *Pavlov* 218 [MW!]; on the river bank Pskem, near village Sidjak, 28.05.1958, *Pavlov* 112 [MW!]; over the bridge through river Pskem in the village Bogustan, 11.06.1948, *Pavlov* [MW!]; valley of the Pskem river, right bank of the Har-amzadasaya, 09.06.1956, *Tsukervanik* 169; valley of the Pskem river, Karabulak hole, 02.08.1956, *Vvedensky, Kovalevskaya* 39; valley of the Pskem river, Teparsay, 18.05.1965, *Pyataev*; surrounding village Nanay, 01.06.1966, *students*; neighborhood village Nanay, 27.06.1966, *Vybornov*). UGAM RANGE (neighbors village Khumsan, 16.06.1922, *Simonova* 229; neighbors village Khumsan, 16.07.1922, *Simonov, Botuyev*; neighbors village Khumsan, the right bank of the Kargalysaya, 13.07.1960, *Perelygina*; above the village Khumsan, 09.06.1971, *Mukhamedzhanov*; above the village Khumsan, 09.06.1971, *Salimova et al.*; the left bank of Urungachsay, 20.07.1963,

Puchkova 154). MAYDANTAL RANGE (Oiganin river valley, 04.06.1963, *Puchkova 91*). I-1-b Western Chatkal district: CHATKAL RANGE (Big Chimgan, eastern slope, 10.07.1969, *Pimenov et al 1073* [MW!]; Big Chimgan, 19.07.1920, *Vasiliev*; right bank of the Handalyk river, 19.06.1921, *Pasiy 44*; river valley Kyzyltal, 1921, *Baranov 158*; on the way from Irgaylyk to Gunambay, 18.06.1921, *Uranov 920*; neighborhood village Nurekata, 21.06.1925, *Lapin*; neighborhood Chimgan Botanical Station, 04.08.1925, *Gomolitsky 174*; the gorge of the river Chimganka, 26.08.1928, *Gomolitsky 476*; Big Chimgan, 25.09.1929, *Gomolitsky*; between the rivers Nurekata and Aksakata, 25.07.1936, *Korotkova, Titov 1684*; headwaters of the Parkentsay river, 30.06.1936, *Korotkova, Titov 837, 838*; Sokaksai river basin, Guzaksay, 16.08.1938, *Saranskaya, Klima 460, 461*; Chatkal forestry reserve, Kyzyl-say, 07.07.1950, *students*; Bashkizylsay river valley, headwaters of Sarytuproksay, 22.07.1972, *Adylov 107*; Kelinchek hole, 12.06.1977, *Kari*). I-1-d Kurama district: CHATKAL RANGE (right bank of Angren, headwaters of the Shavas River, 19.06.1924, *Korovin 284, 285*; northern slopes of Cattasay, 26.05.1930, *Pinkhasov*; Say Itelge, 10.06.1931, *Mackiewicz*; northern slopes, Katta-say, 29.05.1939, *Pinkhasov*; Angren river basin, Dostarsay, 22.07.1938, *Pyataev, Momotov 149*). KURAMA RANGE (headwaters of the Gushsay river, near the Pangas Pass, 04.08.1930, *Kudryashev 991*; Angren river valley, Lyashkarak-say, 04.05.1945, *Korotkova*). I-1-e Chorkesar district: KURAMA RANGE (headwaters of the river Kandagan, Indigan Pass, 11.08.1949, *Bondarenko 1434*). I-3 Fergana-Alay region. I-3-b Eastern Alay district: ALAY RANGE (Shakhimardan river basin, Aksu river, 28.07.1966, *Khalkuziev*; Shakhimardan river basin, gorge Bouva, 07.09.1968, *Khalkuziev*; neighborhood village Yardan, Dugobasay river valley, 07.07.1961, *Pyataeva and students*; neighborhood village Yardan, 15.04.1964, *Shonazarov 348*; neighborhood village Shakhimardan, 20.06.1964, *Shonazarov 2037*). I-5-a North Turkestan district: TURKESTAN RANGE (Goralash hole, 24.07.1926, *Androssov, Popov 3065*; the gorge of the river Gurulash, 24.07.1926, *Popov, Androssov*; the river Aktashsay, 01.09.1932, *Titov, Ioffe 420*; Guralash river basin, Lyangar Pass, 06.07.1934, *Zakrzhevsky 241*; Guralash river basin, Lyangar Pass, 07.08.1934, *Zakrzhevsky 251*; Sanzar river basin, Zamin Forestry Park, 07.17.1934, *Gomolitsky. Protopopov 226*; Guralash river basin, the valley of the river Tyuatashsay, 18.07.1935, *Zakrzhevsky 1023, 1024*; headwaters of the river Sanzar, Guralash reserve, 30.06.1937, *Korotkova, Vassilkovskaya 488*; Guralash Reserve, Kichkinasay, 28.07.1944, *Pasiy 22246, 22247*; Guralash reserve, Angrylsay valley, 09.08.1944, *Pasiy 22241, 22242, 22243, 22244, 22245*; Guralash reserve, Tyuyatashsay river valley, 18.06.1944, *Nazarenko*). I-6 Western Hissar region. I-6-a Kashkadarya district: HISSAR RANGE (Ak-su river valley, near mountains Khazret-Sultan, 2.700 m a.s.l., 16.07.1933, *Schilikina et al 226* [MW!]). I-7 Hissar-Darvaz region. I-7-a Sangardak-Tupalang district: HISSAR RANGE (Sangardak river basin, 22.08.1937, *Lepeshkin, Pavlov 10921* [TASH!]).

II. *Primula* sect. *Algidae* Sennikov, in Fl. Uzbekistan 2:12 (2017). Inflorescences subtended by bracts, which are strongly reflexed after anthesis, linear to linear-lanceolate. Section type: *Primula algida* Adams

6. *Primula algida* Adams, in Weber & Mohr. Beitr. Naturk. 1: 46 (1805). Fedorov in Fl. USSR 18: 158 (1952); Kovalevskaya in Fl. Uzbekistan 5: 37 (1961); Kovalevskaya in Consp. Fl. Asiae Med. 8: 13 (1986). (Figure 1A)

Holotype. Described from Caucasus, Adams. Type is not indicated.

—*Aleuritia algida* (Adams) Soják, Čas. Nár. Muz. Praze, Rada Přír. 148(3–4): 203 (1980).

Diagnosis. Perennial, covered with farinose or glabrous, rhizome short, releasing numerous whitish roots. Leaves with petioles 1.5–7 cm long, usually 3–4 cm, 0.5–2.5 cm wide, oblong or almost obovate, rounded or obtuse at apex, gradually extended into a short broad-winged petiole, sometimes equal in length to 1/2 laminae. Scape variable from 3–20 cm long, up to 35–40 cm in fruit, farinose under the apex or glabrous. Flowers usually heteromorphic, umbellate. Involucral bracts 3–11 mm long, 1–2 mm wide, linear or linear-lanceolate, acute. Calyx 5–10 mm long, dolichocampaniform, with five veins, without wax or with a farinose coating, almost 1/2 incised into oblong or lanceolate, acutate or bluntly-teeth, usually with purple pigmentation. Corolla with a flat violet limb, less whitish and with a yellowish or white tube; corolla tube equal to the calyx or slightly exceeding; limb 12–13 mm broad; lobes narrow, 4.5–5 mm long, emarginated. Capsule oblong, more or less the calyx length. Seeds 0.5 mm long, irregularly oblong-ovoid, brown. Fl. May-June

Taxonomic notes. More robust and stocky than the familiar *P. farinosa* and with little or no farinose. Based on the absence or occurrence of farinose the species has been variously termed as var. *sibirica* (Ledeb.) Pax or var. *armena* (C. Koch) Pax.

Habitat. On subalpine and alpine meadows and lawns, moraines, stony placers, near snow in the upper belt of mountains, 2,400–3,100 m a.s.l.

General distribution. Caucasus, Iraq, Iran, Afghanistan, Russia (Western Siberia), Mongolia, Middle Asia (Tarbagatay, Tien Shan, Pamir-Alay): Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan.

Distribution in Uzbekistan. I-1 Western Tien-Shan region. I-1-a Ugam-Pskem district: MAYDANTAL RANGE (River bank of the Oigayin, at the confluence of the river Maydantal, 1,500 m a.s.l., 03.09.1953, *Pavlov 605*; a middle flow of the river Oigayin, between gorge Kok-su and Tundyk, 2,900 m a.s.l., 16.08.1954, *Pavlov 271* [MW!]; upper gorge Bakraksay, 3,400 m a.s.l., 19.08.1959, *Pavlov 57* [MW!]). I-1-b Western Chatkal district: CHATKAL RANGE (Bashkizylsay river basin, Chatkal Forestry Reserve, 01.08.1950, *students*). I-1-c Arashan district: CHATKAL RANGE (neighborhood Arashan, 15.08.1924, *Sivetkina 173*; upper river Angren, Arashan, 28.07.1938, *Pyataev, Momotov 324, 381*; Angren Plateau, river basin Kelinchak, 19.08.1939, *Kudryashev 1219, 1291*; Arashan pass, 24.07.1940, *Korotkova 278*; on the watershed between Chaili-say and Angren, 01.07.1954, *Nabiyev, Li 371*; Uchtashsay, 02.07.1954, *Butkov, Maylun 286, 351*; lake Arashan, 11.07.1959, *Petrov*). KURAMA RANGE (hole Betagalyk, 05.07.1949, *Bondarenko 1386*; the hole Betagalyk, 11.08.1949, *Tscheverenidi 1438, 1456, 1457, 1460, 1389, 1386*). I-1-d Kurama district: KURAMA RANGE (Angren, by say on a damp place, 18.05.1931, *Matskevich 29*). I-3 Fergana-Alay region. I-3-b Eastern Alay district: ALAY RANGE (Shakhimardan river basin, upper Yardan, 25.06.1962, *Sukervanik 402*; gorge Mashalang, 09.06.1967, *Khalkuziyev*). I-7 Hissar-Darvaz region. I-7-a Sangardak-Tupalang district: HISSAR RANGE (Tupalang river basin, hole Kuparma, 16.08.1937, *Lepeshkin, Kutaeva 10970*; pass Kalon, 16.08.1937, *Lepeshkin, 10972, 10973*).

III. *Primula* sect. *Aleuritia* Duby, in DC., Prodr. 8: 41 (1844). Section type: *Primula farinosa* Linneanus

7. *Primula capitellata* Boiss., in Diagn. Orient. ser. 1,7: 64 (1846). Kovalevskaya in Fl. Uzbekistan 5: 37 (1961); Kovalevskaya in Consp. Fl. Asiae Med. 8: 13 (1986). (Figure 1C)

Type. SOUTH PERSIA: in pratis limosis montis Kuh-Dana, 3,000–3,600 m a.s.l., 10.07.1842, *Kotschy 602* (holotype, G)

≡ *Aleuritia capitellata* (Boiss.) Soják, Čas. Nár. Muz. Praze, Rada Přír. 148(3–4): 203 (1980).

Diagnosis. Rhizome short, with a bunch of thin filamentary whitish roots. Leaves glabrous above, farinose below; plate 2–3 cm long, oblong-obovate, margin serrated or smooth-edged, gradually extended into a short, 1–1.5 cm, broad-winged petiole. Scape 3–4 cm long, only under inflorescence white farinose. Inflorescence multiflorous, dense, almost capitate. Involucral bracts linear-lanceolate, acuminate, at the base with very small auriculate appendages, violet-colored at the top along the edge. Pedicels very short, flowers almost sessile. Calyx 3–4 mm long, dolichocampaniform, up to 1/2 divided into triangular violet-colored teeth. Corolla purple; tube 5–5.5 mm long, cylindrical; limb up to 6 mm diam., with deeply emarginated blades. Capsule elliptical, slightly longer than calyx.

Taxonomic notes. A close relative of *P. farinosa*, differing chiefly by the flowers borne in dense, more or less sessile heads.

Habitat. In the alpine belt, upper 3,000 m a.s.l.

General distribution. C. & S. Iran, C. & E. Afghanistan, Pakistan, Middle Asia (Pamir-Alay: Zaravshan and Hissar ranges): Tajikistan, Uzbekistan.

Distribution in Uzbekistan. I-6 Western Hissar region. I-6-a Kashkadarya district: HISSAR RANGE (upper river Yakkabag, neighborhood village Tashkurgan, 18.06.1936, *Botschantsev, Butkov* 30). I-6-c Baysun district: HISSAR RANGE (Baysuntau, river basin Machaydarya, 11.05.2012, *Turginov* 2247). I-5 Kukhistan region. I-5-b Malguzar district: MALGUZAR RANGE (Shink river basin, Malguzarsay, 25.06.1942, *Schugaeva, Sergeyeva*).

8. *Primula baldshuanica* B. Fedtsch., Consp. Fl. Turkestanicae 5: 6 (1913).

Fedorov in Fl. USSR 18: 160 (1952); Kovalevskaya in Fl. Uzbekistan 5: 38 (1961); Kovalevskaya in Consp. Fl. Asiae Med. 8: 14 (1986).

(Figure 1B)

Type. TAJIKISTAN: in Baldshuan, Rysilm, 3,000', IV 1883, *Regel* (LE!, isotype, E)

—*Aleuritia baldschuanica* (B.Fedtsch.) Soják, Čas. Nár. Muz. Praze, Rada Přír. 148(3–4): 203 (1980).

Diagnosis. Perennial, rhizome short, with a tuft of rather slender brownish roots. Leaves from above glabrous, below with a thick white farinose coating, less often without it; blade 3–6 cm long, oblong-obovate, rounded at the top, irregularly serrated along the edge, gradually extended into a long, almost equal to the plate winged petiole, less often almost sessile. Scape 7–25 cm long, upper part with washable farinose coating. Inflorescence multiflorous, friable, semi-capitate. Involucral bracts narrowly linear, with a slight farinose coating, acute, enlarged and minutely gibbous at base and with small appendages (humps). Pedicels almost twice shorter than involucre. Calyx 5–7 mm long, campanulate, with thin ribs, 1/3 or 1/2 divided into linear teeth, with farinose coating. Corolla violet; tube 7–10 (12) mm long, darker than limb, cylindrical, slightly expanded under throat; limb 8–15 mm diam., with deeply emarginated blades. Capsule oblong, equal in length to calyx. Fl. July–August.

Taxonomic notes. Named for the type location Baldschuan (Boldzhuan), Tajikistan. Initially considered *P. farinosa*, this species is distinguished by violet flowers with narrowly obcordate corolla lobes. Similar to *P. algida*, which has a shorter corolla tube, broader bracts and a more compact umbel.

Habitat. In the lower and middle zones, on outcrops of red sandstone, limestone outcrops, loess, gravelly-fine-earthly slopes, under rocks, 750–2,200 m a.s.l.

General distribution. Afghanistan, Middle Asia (Pamir-Alay). Tajikistan, Uzbekistan.

Distribution in Uzbekistan. I-6 Western Hissar region. I-6-c Baysun district: HISSAR RANGE (Baysuntau, neighborhood Khodjaipak,

13.05.1930, *Bo* 240; *Botschansev, Vvedensky*; Machaydarya river basin, 16.04.2011, *Turginov* 101, 2095; Baysuntau, Shatut, 23.04.2012, *Turginov* 1771). I- I-7 Hissar-Darvaz region. 7-a Sangardak-Tupalang district: HISSAR RANGE (neighborhood village Nilu, 04.05.1948, *Schevrenidi* 445; Gullob river basin, 12.05.1948, *Bondarenko* 445; neighborhood village Nilu, 25.03.2010, *Tojibaev, Maltzev*). I-8 Pyanj region. I-8-a Babatag district: BABATAG RANGE (neighborhood village Schagam, 1936, *Lepeshkin, Muhammedjanov* 480).

IV. *Primula* sect. *Armerina* Lindl. in Edward's Bot. Reg. 32: t. 31 (1846).

Section type: *Primula involucrata* Wallich

9. *Primula iljinskii* Fedorov in Schischk. & Bobrov, Fl. USSR 18: 726 (1952).

Kovalevskaya in Fl. Uzbekistan 5: 38 (1961); Kovalevskaya in Consp. Fl. Asiae Med. 8: 13 (1986).

(Figure 1M).

Type. TAJIKISTAN: in Seravschania, lacus Iskander-Kul, alt. ca. 2,500 m s.m., in regione juniprina, 18.V.1893, *V.L. Komarov* (holotype, LE!, isotype E!)

≡ *Aleuritia iljinskii* (Fed.) Soják, Čas. Nár. Muz. Praze, Rada Přír. 148 (3–4): 203 (1980).

Diagnosis. Perennial, thin, without farinose coating, rhizome short, with thin filamentary roots. Leaves in a friable basal rosette, greenish; blade 1–3 cm long, oblong-scapular or obovate, smooth-edged, less obscure serrated, gradually pulled into wingless petiole 2–3 times longer than blade. Scape 7–35 cm long, after flowering very elongated, thin, sometimes filariform. Umbel 2–6 (8) floral, friable. Involucral bracts oblong-lanceolate, at the base with auriculate appendages 1–2 mm long. Pedicels 2–3 times longer than involucre. Calyx 4–7 mm long, cylindrical, up to 1/3 divided into reflect, triangular, along the edge glandular-villous teeth. Corolla with pinkish-violet (in the herbarium blue) limb and a light (in the herbarium yellowish) tube; tube 5–8 mm long; limb 5–7 mm in diam., with deeply emarginated blades. Capsule oblong-cylindrical, 1.5–2 times longer than calyx. Fl. May–July.

Taxonomic notes. Differ from *P. sibirica* Jacq. in the smaller flowers, spatulate leaves gradually tapering into the petiole, and slender sometimes almost filiform scapes. Additional characters distinguishing this plant from the other closely related species *P. pamirica* Fedorov are the weak rosettes, thin slender leaves, and few-flowered inflorescences.

Habitat. In the middle and upper zones, in the floodplains of rivers, at springs, in humid places, 2,200–3,300 m a.s.l.

General distribution. Middle Asia (Pamir-Alay): Kyrgyzstan, Tajikistan, Uzbekistan

Distribution in Uzbekistan. I-5 Kukhistan region. I-5-a North Turkestan district: TURKESTAN RANGE (gorge of the river Guralash, 20.07.1926, *Popov, Androsov* 44, 265; Guralash river basin, 19.07.1934, *Zakrzhevsky* 420; Kaltasay, 17.06.1935, *Zakrzhevsky* 409, 735; upper Sanzar, Guralash reserve, 08.07.1937, *Korotkova, Vasilkovskaya* 600, 938; upper Sanzar, Guralash reserve, 1938, *Korotkova* 277).

10. **Primula pamirica* Fedodov, in Schischk. & Bobrov, Fl. USSR 18: 724 (1952).

Kovalevskaya in Consp. Flor. Asiae Med. 8: 13 (1986).

(Figure 1J)

Type. TAJIKISTAN: in Pamiria, ad ripam australem 1. Kara-Kul, 05.07.1913, *O. Knorring* (holotype, LE!, Isotype, E!)

Diagnosis. Perennial, glabrous devoid of farinose coating; rhizome short. Leaves stoutish, form dense rosettes, obovate-

scapular, oblong at the top or somewhat acuminate, gradually reflected into a long winged petiole, thick, even somewhat coriaceous, 3–5–7 cm long, 0.6–0.7 (1.5) cm wide. Scape strong, elongated, 15–20 (30) cm, unclearly longitudinally striped, after flowering, strongly growing in length and thickness, at the apex continuing into a multi-beam, dense umbellate inflorescence; the rays of the umbel unequal, 1–2 (5) cm long, 1.5–2 times extending bracts, under the apex black and finely glandular-dotted. Involucral bracts oblong, 7–10 (12) cm long, with mucronate, at the base with auricular, glandular-acuminate. Calyx tubular up to 1/3 incised into slightly reflected, mucronate, densely and black glandular-punctate. Corolla tube twice longer than calyx, expanded into a pale pink limb, 1.5–2 cm diam., with obcordate, deeply 2-divided lobes. Capsule oblong at the apex in the mature state it opens with acute teeth. Seeds chestnut-colored, unevenly angular. Fl. May–July.

Taxonomic notes. The species *P. pamiirica* and *P. nutans* close to each other but *P. pamiirica* has more flowers per umbel, a less slender habit and a more glandular-punctate calyx than *P. nutans*. Clearly distinguishable from *P. sibirica* Jacq. by the stout, firm, multiflorous scapes, the dense rosettes, the rather thick and sometimes coriaceous leaves with blades gradually reflected into the petiole, and involucral bracts and calyx densely punctate with minute black hairs. Also differing markedly from *P. Iljinskii* Fedorov in the firm stoutish scapes, the large flowers, and the few-rayed inflorescence (Fedorov 1952).

Habitat. On alpine lawns, banks of rivers, streams, lakes, 2.800–3.500 m a.s.l.

General distribution. Afghanistan, Pakistan, Middle Asia (Tien Shan: Ketmen, Terskey, Kyrghiz, Talas Alatau and Fergana ranges; Pamir-Alay: Turkestan, Zarafshan, Hissar, Alay, Zaalay, Alay Valley, Peter I, Pamir): Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan.

Distribution in Uzbekistan. I-5 Kukhistan region. I-5-a North Turkestan district: TURKESTAN RANGE (Guralash Reserve, 15.06.1946, Nazarenko; Archa-Maydan, 23.06.1947, Nazarenko).

V. *Primula* sect. *Oreophlomis* (Rupr.) Fedorov, Bull. Acad. Sc. Petersb. IV. 276 (1863).

Section type: *Primula auriculata* Lamarck

11. *Primula olgae* Regel, in Acta Horti Petropolit. 3(2): 151 (1875). Fedorov in Fl. USSR 18: 185 (1952); Kovalevskaya in Fl. Uzbekistan 5: 39 (1961); Kovalevskaya in Consp. Fl. Asiae Med. 8: 14 (1986).

(Figure 1I)

Type. UZBEKISTAN: ZARAVSHAN RANGE. Zeravshan Valley, Sangy-Juman Gorge, 25.05.1869, O. Fedtschenko (holotype, LE!)

—*Primula auriculata* subsp. *olgae* (Regel) A.J. Richards, *Primula*: 212 (1993).

Diagnosis. Perennial, rhizome vertical, short, with a bunch of thickish, partly almost filamentary whitish roots; flowering plant very small, 5–10 cm tall, glabrous. Leaves obovate-oblong, reflected into a relatively short, broadly winged petiole, obtuse or somewhat acuminate, almost smooth-edges or irregularly crenulate-denticulate. Scapes twice the length of the leaves, but often equal to or shorter than leaves in flowering, in fruits often very elongated, 5–7–10 (30) cm long. Inflorescence small, relatively low-flowered, dense, almost capitate due to short pedicels; lateral pedicels developed stronger than the median, which makes the inflorescence flattened from above. Involucral bracts lanceolate, acute, with an auricle at the base, exceed the length of the peduncle (during flowering). Pedicels noticeably shorter than the flowers. Involucral bracts and Calyx without black dots. Calyx short

campanulate, 3–4 mm long, green, often with short purple stripes; corolla lobes lanceolate, acute, about as long as the tube. Corolla blue or pink; corolla tube twice or more exceeding calyx, 8 mm long; limb up to 10–14 mm diam.; lobes obcordate bilobulate. Seeds mucronate to both ends. Fl. May–July.

Taxonomic notes. The same characters distinguish *P. olgae* from *P. auriculata*, and these two species differ also in general appearance.

Habitat. On the banks of the rivers and streams, on the Saaz, subalpine and alpine meadows and lawns, moraines on average, often in the upper belt of mountains, 2.400–3.200 m a.s.l.

General distribution. Middle Asia (Tien Shan: Fergana Range; Pamir-Alay: Alay Range, Turkestan, Zarafshan, Hissar, Karategin, Darvaz, Petra 1, Kugitang, Low-Mountain South Tajikistan): Kyrgyzstan, Tajikistan, Uzbekistan.

Distribution in Uzbekistan. I-5 Kukhistan region. I-5-a North Turkestan district: TURKESTAN RANGE (gorge of the river Guralash, 26.07.1926, Popov, Androsov 181, 229, 238; Chumkartau mountains, Baykungur river valley, 15.08.1932, Titov, Yeliseyev 259, 320; Guralash river basin, headwaters of the river Sortjan, 28.06.1934, Zakrzhevsky 101, 103; Kyzyl-Turuk river valley, 01.08.1934, Zakrzhevsky 207, 208; Aldashma river valley, 17.09.1934, Gomolitskiy 365; upper Guralashsay, 05.07.1935, Zakrzhevsky 700; Guralash reserve, 26.05.1937, Korotkova, Vasilkovskaya 147; Karaultepe, 12.06.1937, Korotkova 278; Guralash reserve, 04.08.1937, Korotkova 832, 961; Shibarlisay, 10.08.1937, Korotkova, Vasilkovskaya 970; Kuyansay, 15.04.1945, Nazarenko; Guralash river valley, 13.07.1967, Vvedensky). I-6 Western Hissar region. I-6-a Kashkadarya district: HISSAR RANGE (Yakkabag Mountains, 1942, Korotkova; neighborhood village Tashkurgan, 18.06.1936, Bochansov, Butkov 17, 561). I-6-c Baysun district: HISSAR RANGE (Chulbair Mountains, upper Khojabarku, 08.06.1929, Vvedensky 274). I-6-d Kugitang district: KUGITANG RANGE (Kurgan Mountains, village Kampyrtepa, 29.04.1915, Popov 320, 321). I-7 Hissar-Darvaz region. I-7-a Sangardak-Tupalang district: HISSAR RANGE (left bank of the river Kyzylsu, flow Sangardak, 01.08.1931, Merkulovich; left bank of the river Shatrut, 20.08.1947, Sumnevich, Dzhanguzarov; upper of Khovat river, 07.09.1947, Pyataev 541, 578; upper of Gava river, 11.07.1947, Pyataev 926; upper of Chushma-Garman river, 16.08.1947, Sumnevich, Dzhanguzarov; on the spring Shakhmat, 03.06.1948, Bondarenko 947; middle flow Kultensay, 26.06.1948, Pyataeva 753; neighborhood of the lake Aygyrkul, 19.07.1948, Schevrenidi 1185; right bank of the river Tamshush, Sauksay, 14.07.1961, Tuychiyev, Khodjimatom).

VI. *Primula* sect. *Fedtschenkoana* Wendelbo ex Sennikov.

Wendelbo in Rechinger, Fl. Iranica 9: 7 (1965), nom. inval. (Art. 38.11), —“fedtschenkoana”.

Rootstock fleshy, tuberous. Petals subentire.

Section type: *Primula fedtschenkoi* Regel

12. *Primula fedtschenkoi* Regel, in Acta Horti Petropolit. 3(2): 133 (1875).

Fedorov in Fl. USSR 18: 189 (1952); Kovalevskaya in Fl. Uzbekistan 5: 39 (1961); Kovalevskaya in Consp. Fl. Asiae Med. 8: 14 (1986).

(Figure 1F)

Type. UZBEKISTAN: ZARAVSHAN RANGE. Mountains Chupan-Ata (2.600'), 18.03.1869, O. Fedtschenko (holotype, LE!, isotypes, TASHI, MWI)

Diagnosis. Perennial, rhizome short, with a bunch of thick, brown, fusiform roots. Leaves thin, oblong-obovate, with rounded or acuminate apex, blunt-pointed round-denticle or with acute denticles along the edge, gradually reflected into a short petiole or almost sessile, 3–4–6 (12) cm long, 7–14–18 (30) mm wide, on

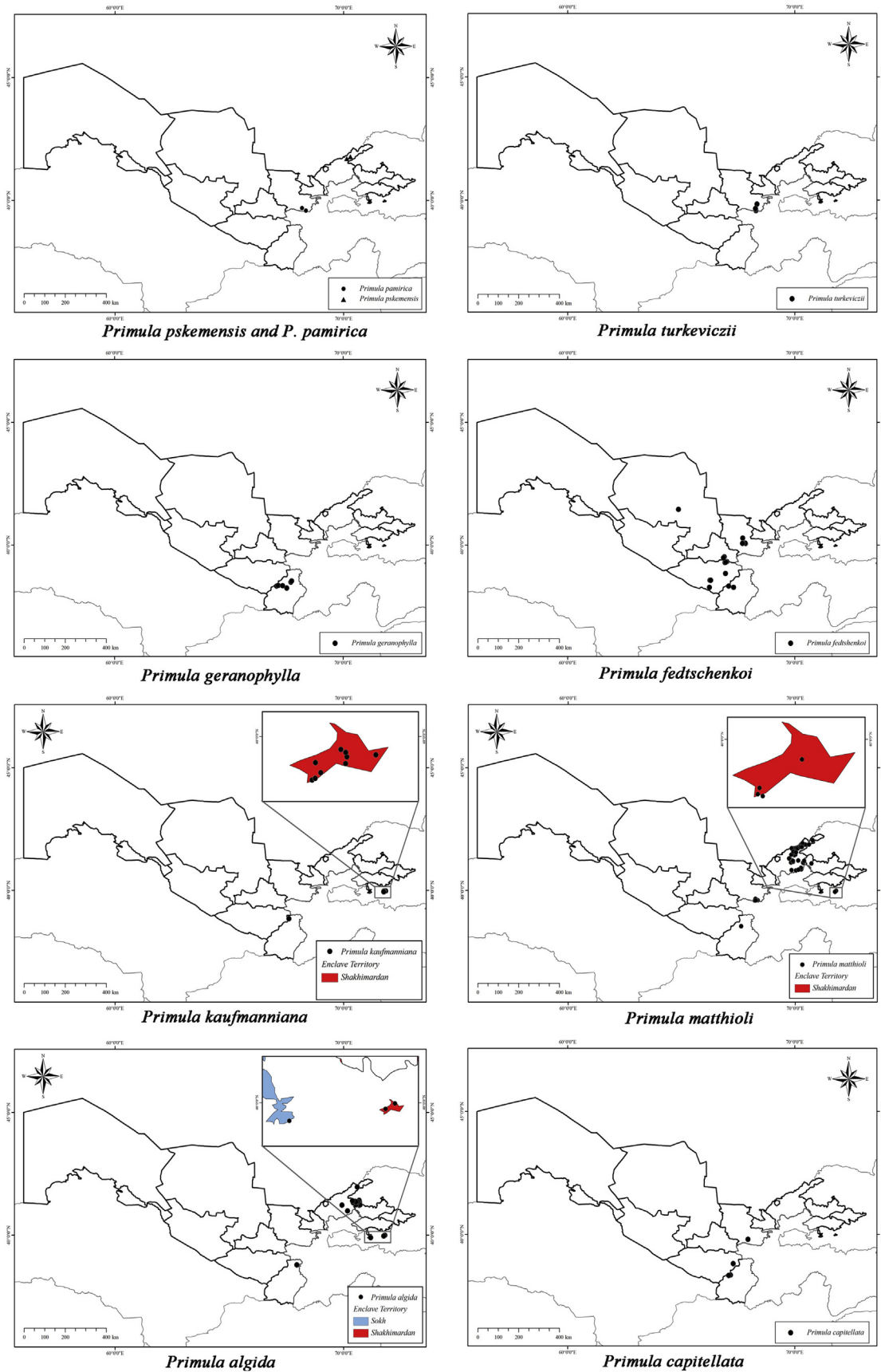


Figure 2. Distribution maps table of the genus for the territory of Uzbekistan.

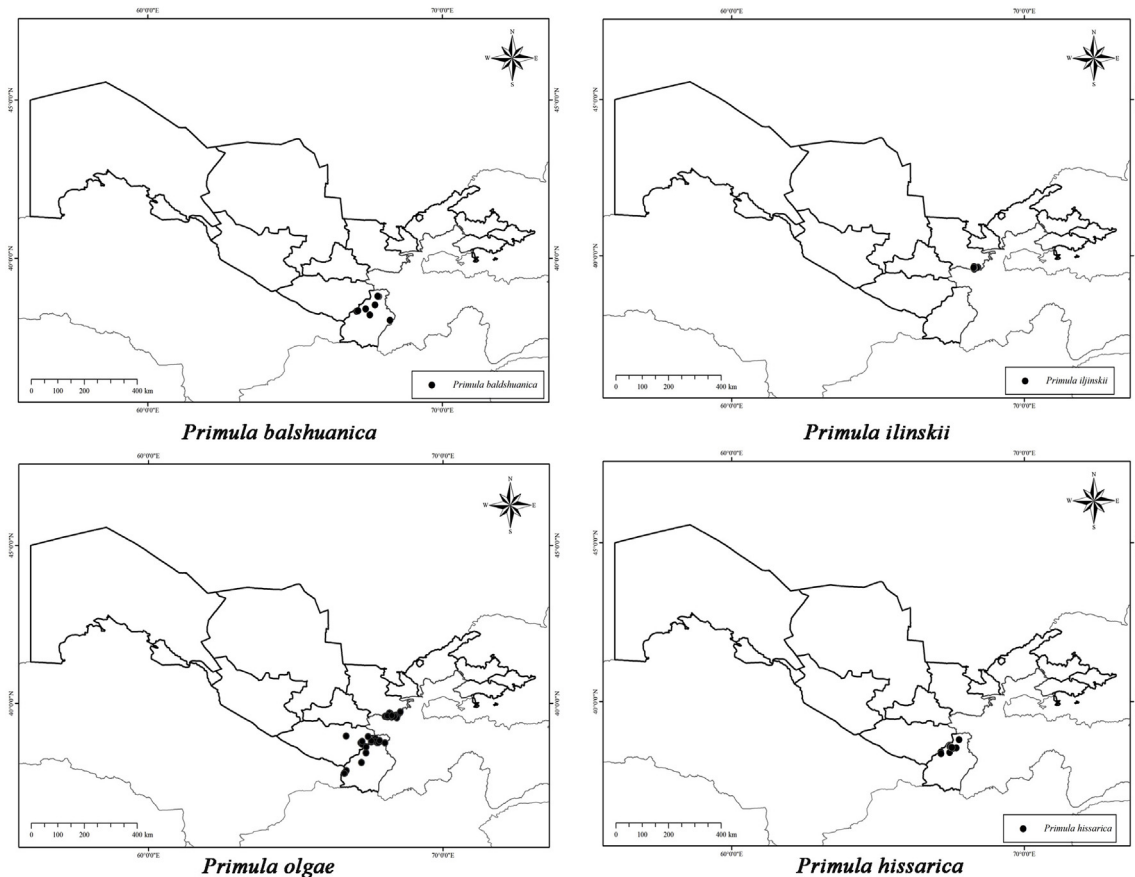


Figure 2. (continued).

both sides glabrous or barely farinose below. Scape 8–12 cm when flowering, up to 15–25 cm fruiting, thin, glabrous. Umbel firm; pedicels short, erect, sometimes flourey, 3–8 mm long, elongating up to 2 cm in fruit. Involucral bracts few short, up to 2 mm long, lanceolate acuminate leaves. Calyx small, 3–6 mm long, campanulate, sometimes farinose inside, up to 1/2 incised into acute lanceolate dens. Corolla large, purple-lilac, with a flat limb 12–18 mm diam., with elliptical or obovate, almost smooth-lobes and a narrow tube 2–3 times exceeding calyx, in the throat somewhat infundibular extended. Capsule spherical, covered to the top by adjacent denticles of the calyx, up to 6 mm long. Fl. March-May.

Taxonomic notes. The sole member of Section *Fedtschenkoana*, this species is related to species in Section *Crystallophlomis*. Unusual in that this species is summer dormant and is supported by a tuberous rhizome with several ovate cataphylls on top.

Habitat. On loessy wooded slopes of the foothills and the lower belt of mountains, sometimes rises to the middle belt, 700–2,600 m a.s.l.

General distribution. Iran, Afghanistan, Middle Asia (Kyzyl Kum, Western Tien Shan, Pamir-Alay, Badkhyz): Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan.

Distribution in Uzbekistan. I-4 Nurata region. I-4-a Nurata district: NURATA RANGE (neighborhood Farish, 20.03.1992, *Beshko*). I-4-c Prinurata district: PRINURATA RELECT MOUNTAINS (Pistaltau, 22.04.1986, *Pimenov et al* 112 [MW!]; Pistaltau, 16.04.2012, *Batoshev* 161). I-5 Kukhistan region. I-5-a North Turkestan district: TURKESTAN RANGE (right bank of the river Sanzar, 02.04.1921, *Vvedensky*). I-5-b Malguzar district: MALGUZAR RANGE (Jizzakh, 26.03.1882, *Regel* [MW!]; hole at the right bank of the river Sanzar, 02.04.1921, *Vvedensky* 118

[MW!]; neighborhood of Jizzakh, 29.03.1913, *Androsov* 132; gate of Temurlang, 01.04.1921, *Korovin* 3052, 3057). I-5-c Urgut district: ZARAVSHAN RANGE (on the way from Aman-Kutan to pass Takhta-Karacha, 03.05.1913, *Michelsohn* [NS, MW!]; Aman-Kutan, 20.04.1915, *Fedtschenko* 365 [MW!]; Agalyk, 11.04.1923, *students*; neighborhood village Aman-Kutan, Yulsay, 06.04.1936, *Nikanorov*; Khodjasay, 24.04.1936, *Nikanorov*; village Aman-Kutan, 25.04.1957, *Ergashev* 180; pass Takhta-Karacha, 11.04.1958, *Vvedensky et al* 57; Takhta-Karacha, 10.04.2012, *Tojibaev*; Aman-Kutan village, Maydansay, 30.04.1912, *Nikanorov*; Agalyk, 7.04.1941, *Zakirov* 12). I-6 Western Hissar region. I-6-a Kashkadarya district: HISSAR RANGE (Mountains Maidanak, between village Urtadara and Kani over Lyangar, 02.05.1979, *Pimenov et al* 282 [MW!]; Yakkabag, neighborhood village Ishkent, 20.04.1942, *Arnoldi*). I-6-c Baysun district: HISSAR RANGE (Baysuntau, Machaydarya river basin, 18.04.2012, *Turginov*; neighborhood village Amankhana, 18.04.2012, *Turginov* 1902). I-6-b Tarkapchigay district: HISSAR RANGE (north slopes of the mountains Nagorakhana, 05.04.1935, *Lepeshkin* 26, 28; neighborhood village Kyzylcha, 22.04.1961, *Bondarenko*, *Butkov* 35). II-3 Kyzylkum region. II-3-b Kyzylkum district: KYZYLKUM RELICT MOUNTAINS (Zhetymtag Mountains, 12.04.1914, *Kultiassov*).

VII. *Primula* sect. *Dionysiopsis* Pax, in Schles. Gesellsch. Vaterl. Kult. 87: 19 (1909).

Section type: *Dionysia hissarica* Lipsky

—*Dionysia* sect. *Dionysiopsis* (Pax) Smoljan. Fedorov in Fl. USSR 18: 728 (1952).

13. *Primula hissarica* (Lipsky) Bornm., in Bull. Herb. Boissier (ser. 2) 3: 592 (1903).11

Smolyaninova Fedorov in Fl. USSR 18: 213 (1952); Kovalevskaya in Fl. Uzbekistan 5: 40 (1961); Kovalevskaya in Consp. Fl. Asiae Med. 8: 19 (1986).

(Figure 1L)

Type. UZBEKISTAN: HISSAR RANGE. In Denau, gorge river Khursan, 26.06.1896, V.I. Lipsky (holotype and isotype, LE!)

—*Dionysia hissarica* Lipsky in Acta Horti Petropolit. 18: 83 (1900).

Diagnosis. Subshrubs, forming dense pillows; stems numerous, up to 30–40 cm long. Leaves thin, spatulate-oblong, cuneately narrowed at base, sessile, tapering downward, with 3–4 or rarely 5 large teeth on either side, 6–16 mm long, 2.5–7 mm wide, faintly aromatic, strongly glandular-pubescent, long hairs more numerous at the tips of teeth; peduncles slender, 10–23 mm long, nodding, glandular-pubescent; flowers yellow, in umbels of 2 or 3, pedicellate; pedicels 5–17 mm long, 1 mm thick, densely glandular-pubescent; bracts at the base of umbel 2–3, with 3–5 teeth on either side, 11–20 mm long and 5–10.5 mm wide, glandular-pubescent, resembling the leaves in shape and size. Calyx 6–8.5 mm long, broadly 11campanulate, almost to the base separated, glandular-pubescent; sepals acuminate, entire. Corolla tubular-funnelform, 1.7–2 cm long, glabrous; corolla tube cylindrical, 2.5–3 cm long, twice length of calyx, limb 7.5–9 mm across, lobes ligulate, entire, 4–4.5 mm long and 2 mm wide. Capsule subglobose, 4–5 mm long, 4–9-seeded; seeds small, 1.5–1.7 mm long and 1–1.5 mm wide, subglobose or broadly ovoid, flattened, brown, papillose. Fl. May–June.

Taxonomic notes. *D. hissarica* Lipsky was included in the section *Dionysiopsis* of the genus *Primula* which established and regarded as closely related to the genus. Bornmüller (1911) points out that the section *Dionysiopsis* Pax, occupying an intermediate position between the genera *Dionysia* and *Primula*, maybe rightly considered as a distinct genus. The systematics of *P. hissarica* is as yet insufficiently clarified and its generic position needs further study.

Habitat. In the crevices of rocks, at an altitude of 1.000–1.500 m a.s.l.

General distribution. Middle Asia (Western Pamir-Alay): Uzbekistan. Endem.

Distribution in Uzbekistan. I–6 Western Hissar region. I–6–c Baysun district: HISSAR RANGE (neighborhood village Alachapan, 05.10.1940, Popov, Vasilkovskaya 400; Baysuntau Mountains, neighborhood village Yukori Machay, 9.07.2011, Turginov 0251; neighborhood village Yukori Machay, 11.05.2012, Turginov). I–7 Hissar-Darvaz region. I–7–a Sangardak-Topalang district: HISSAR RANGE (upper flow of Sangardaksay, 27.10.1929, Kuznetsova 194; gorge of the river Topalang, 01.08.1931, Merkulovich; neighborhood village Sangardak, 16.08.1937, Lepeshkin, Pavlova 10982, 10983; gorge of the river Sangardak, 10.09.1937, Lepeshkin, Pavlova 10976, 10977, 10978, 10979, 10980; higher of village Haek, 30.05.1948, Schevrenidi 781; near village Sangardak, 30.05.1948, Nabiev et al 482; neighborhood village Khandiza, 10.05.1985, Baranov 62; Sangardak river basin, 06.08.1991, Murodov).

Discussion

The present work adopts species diversity of *Primula* in accordance with the concept of new Flora of Uzbekistan Project (Sennikov et al 2016) and provides comprehensive information on the diversity and distribution of 13 species of *Primula* in the Flora of Uzbekistan (Figure 2). The genus has been revised especially in the context of the genus *Dionysia* Fenzl which is represented in the flora of Uzbekistan with the only one species (*D. hissarica* Lipsky). Genus *Dionysia* was reduced to the sect. *Dionysiopsis* Pax. *Primula hissarica* is endemic species of Uzbekistan and naturally growing in

the southern part of the country (Tojibaev and Turginov 2012), although five species are presented in the flora of Middle Asia (Kovalevskaya 1988). The main center of section diversity can be treated area of Flora Iranica with about 30 species (Wendelbo 1965). *Primula pamirica* was recorded for the first time for the flora of Uzbekistan, as well as *Primula pskemensis* (*) recently described from the border region from Kyrgyzstan. A new monotypic section *Fedtschenkoana* represents original low mountainous branch of the genus within Iran-Middle Asiatic region. The present revision corresponds authors attempts to fulfill taxonomical updating of the genus *Primula* in the region of Middle Asia due to the botanical geographical divisions of Uzbekistan (Tojibaev et al 2016a, b).

Conflict of interest

The authors declare that there is no conflict of interest.

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